

CLAIMS

1. Process for the localized distribution of drops of a liquid of interest on an active surface of a substrate, the said process comprising the following steps :

- introduction of the liquid of interest into a box via introduction means, the said box enclosing the said active surface, and

10 - extraction of the liquid of interest from the said box via extraction means,

the said active surface and also the other surfaces inside the box being substantially non-wetting with respect to the liquid of interest with the exception of several localized uptake areas, formed in a given manner on the said active surface, which are each suitable for taking up a drop of the liquid of interest,

20 the said means for introducing and for extracting the liquid of interest in the box being arranged such that when the liquid of interest is introduced into the box, it covers the said uptake areas, and when the liquid of interest is extracted from the box, a drop of the said liquid of interest 25 remains captive in a distributed and localized manner on each uptake area.

2. Process according to Claim 1, in which each uptake area is arranged with at least one working area 30 formed on the said active surface such that this

working area is in contact with the captive drop of liquid of interest.

3. Process according to Claim 2, in which at
5 least one working area is an area that is non-wetting
with respect to the liquid of interest.

4. Process according to Claim 2 or 3, in which
at least one uptake area has an open or closed ring
10 shape that encircles the, at least one, working area
arranged therewith.

5. Process according to Claim 4, in which the
area for uptake of the drop of the liquid of interest
15 encircles several working areas.

6. Process according to any one of Claims 1 to
5, in which the working area is an area for detection
of a chemical species that may be present in the liquid
20 of interest.

7. Process according to Claim 6, in which the
working area is an area functionalized with a
biological probe.

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8. Process according to Claim 7, in which the
probe is chosen from the group consisting of an enzyme,
an enzyme substrate, an oligonucleotide, an
oligonucleoside, a protein, a membrane receptor of a
30 eukaryotic or prokaryotic cell, an antibody, an
antigen, a hormone, a metabolite of a living organism,

a toxin of a living organism, a polynucleotide, a polynucleoside or a complementary DNA.

5 9. Process according to Claim 6, in which the
working area is an area functionalized with a chemical
molecule.

10 10. Process according to any one of Claims 2 to
9, in which the working area is an area of electrical
and/or chemical interaction with the said captive drop.

11. Process according to Claim 10, in which the
working area is an electrochemical microcell.

15 12. Process according to any one of Claims 2 to
9, in which the working area comprises a sensor chosen
from the group consisting of optical, electrical,
magnetic, electrostatic, mechanical, thermal and
chemical sensors.

20 13. Process according to any one of Claims 2 to
9, in which the working area comprises an actuator
chosen from the group consisting of optical,
electrical, magnetic, electrostatic, mechanical,
25 thermal and chemical actuators.

30 14. Process according to any one of the
preceding claims, in which at least one of the areas
for uptake of a drop of the liquid of interest is an
electrical or physical uptake area.

15. Process according to Claim 14, in which the uptake area takes up the drop of the liquid of interest via capillary forces.

5 16. Process according to Claim 14, in which the uptake area locally takes up the drop of liquid of interest by wetting.

10 17. Process according to Claim 16, in which the uptake area locally takes up the drop of liquid of interest by means of a wettability of the uptake area for the liquid of interest that is greater than that of the active surface.

15 18. Process according to Claim 16, in which the uptake area locally takes up the drop of liquid of interest by electrowetting.

20 19. Process according to Claim 14, in which the uptake area takes up the drop of liquid of interest via interactions of hydrophilic/hydrophobic type with the liquid of interest.

25 20. Process according to any one of the preceding claims, in which at least one of the uptake areas is in relief or protrudes relative to the active surface on which it is formed.

30 21. Process according to any one of the preceding claims, in which the localized uptake areas,

distributed in a given manner on the said active surface, form a matrix.

22. Process according to any one of the
5 preceding claims, in which, the means for extracting the liquid of interest being means for removing it from the box by suction, the extraction step consists in removing the liquid of interest from the said box by suction.

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23. Process according to any one of the preceding claims, in which, the means for extracting the liquid of interest being means for injecting a gaseous fluid into the box, the extraction step 15 consists in injecting a gaseous fluid into the box so as to expel the liquid of interest from the said box.

24. Process according to Claim 23, in which the gaseous fluid injected is saturated with vapour of the
20 liquid of interest.

25. Use of a process according to any one of the preceding claims in a lab-on-chip or in a microsystem for chemistry or biology.

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26. Use of a process according to any one of Claims 1 to 25 in a biochip chosen from the group consisting of DNA chips, RNA chips, protein chips, antibody chips, antigen chips and cell chips.

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27. Process for detecting at least one molecule that may be present in a liquid of interest, the said process comprising the following steps :

5 - localized distribution of drops of liquid of interest on an active surface in a box according to the process of Claim 1, and

- electrochemical detection in the said drops of the, at least one, molecule that may be present in the said liquid of interest.

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28. Process for the optical detection of at least one molecule that may be present in a liquid of interest, the said process comprising the following steps :

15 - localized distribution of drops of a liquid of interest on an active surface in a box according to the process of Claim 1, and

20 - optical detection in the said drops of the, at least one, molecule that may be present in the said liquid of interest.

25 29. Process according to Claim 27 or 28, in which detections of various molecules that may be present in the liquid of interest are performed in parallel in different drops of liquid of interest captive on the said active surface in the box.

30 30. Process for the electropolymerization of molecules present in a liquid of interest, the said process comprising the following steps :

- localized distribution of drops of liquid of interest on an active surface in a box according to the process of Claim 1, and

5 - electropolymerization in the said box, in the drops of the said liquid of interest, of the molecules to be polymerized.